

Coastal Engineering Technical Note

LOW-COST PROCEDURE FOR MEASURING SHORELINE CHANGE

PURPOSE: To provide a low-cost method for obtaining data on shoreline changes. Shoreline change data acquired at regular intervals over a period of several years can provide the information needed for predicting coastal erosion rates. Beach width measurements acquired near coastal structures can indicate the direction of longshore movement of sediment, reversals in the direction of motion, and onshore-offshore motion.

GENERAL: Long-term crest position relative to changes in a shoreline can be inferred by taking measurements of the berm crest position relative to fixed backshore points. If both the normal and the storm berms are distinguishable, they both should be measured. Although the beach face (or beach slope) is the active zone of sand transport, the width of the beach berm is a good representation of the supply of sand on the beach. The time interval between measurements is normally one month but can be varied depending on indications of significant shoreline changes; i.e., shorter time intervals if local observers see significant changes occurring and longer time intervals if the shoreline is relatively stable. The measurements usually utilize a two-person team although the system is adaptable to a one-person survey. Minimal training is required and local volunteers can be used as observers. The only tool needed is a cloth tape. The berm width is defined as shown in Figure 1.

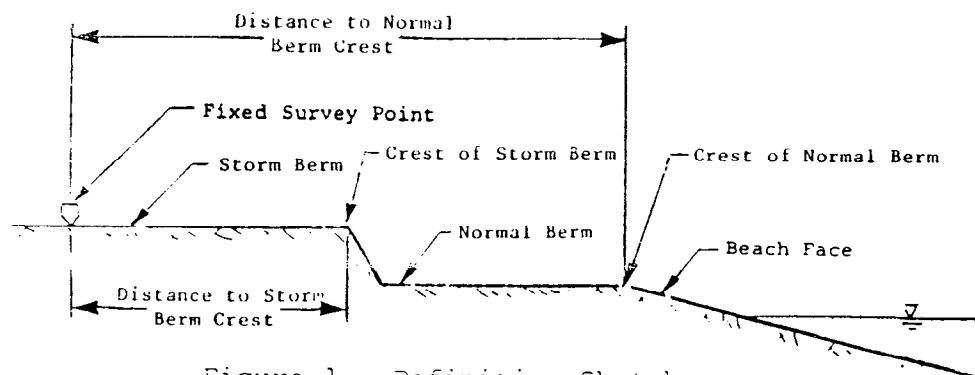


Figure 1. Definition Sketch

METHOD: Fixed reference points that can be easily located and readily accessible are established at points along the shoreline. Typical reference points are curbs, corners of walls, utility poles, or other convenient structures. Points are located where a reference line is available perpendicular to the shoreline. An example is shown in Figure 2.

A cloth survey tape on a reel is used for taking measurements. The person taking the measurements sights back towards the survey point from a point on the berm and uses the predetermined reference line (e.g., the face of a building or a masonry wall) which can be relocated from month to month, to establish his position on the survey line. The first person holds the tape on the survey point. The second person moves right or left to be in line with the reference point and some established aligning point (such as the face of the building shown in Figure 2).

The line is measured from the survey point to the seaward crest of the berm, as shown in Figure 1. Visual sightings are used to keep the survey tape approximately level.

EXAMPLE: An example of data collected at a groin is shown in bar graph format in Figure 3.

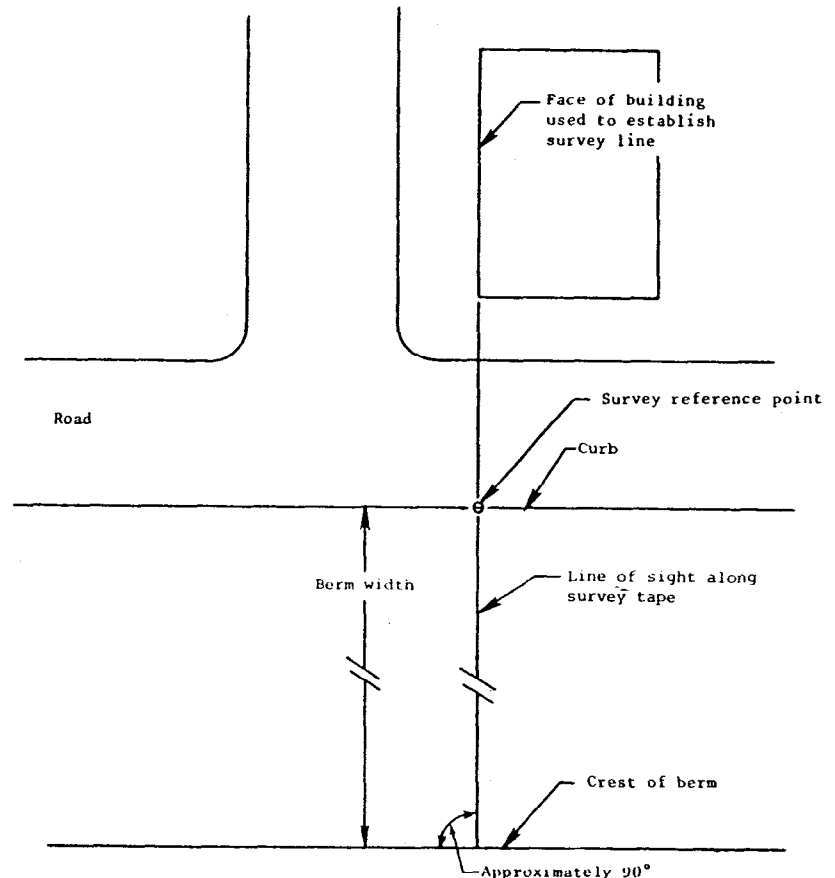


Figure 2. Example of Survey Line

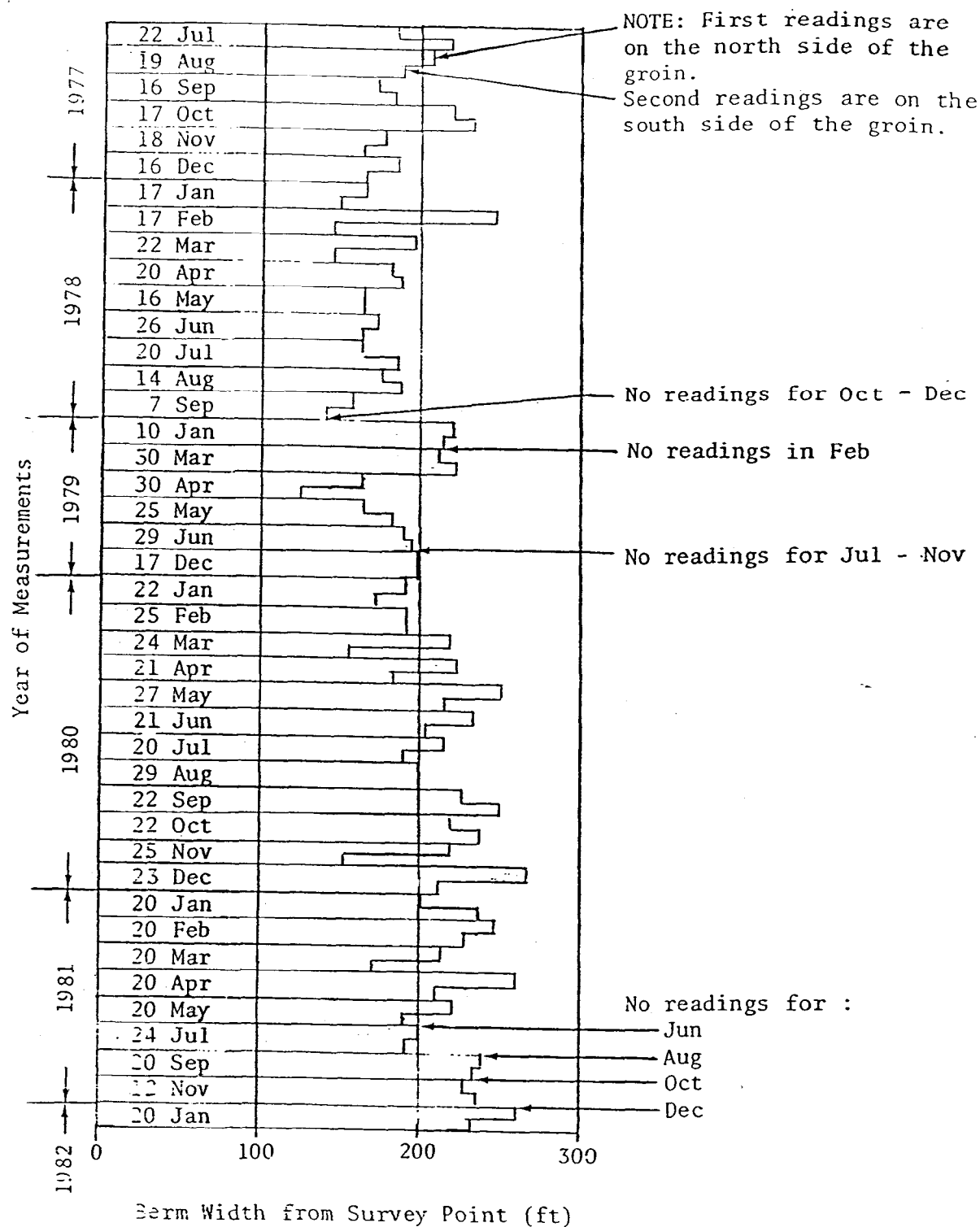


Figure 3. Beach Width Data Collected at the 48th Street Groin (Station 693+44), Newport Beach, California.

The data are plotted as a function of time in Figure 4. When data are collected at a groin, survey lines are established on each side of the groin (where groins are at street ends, a line can be established on each side of the street).

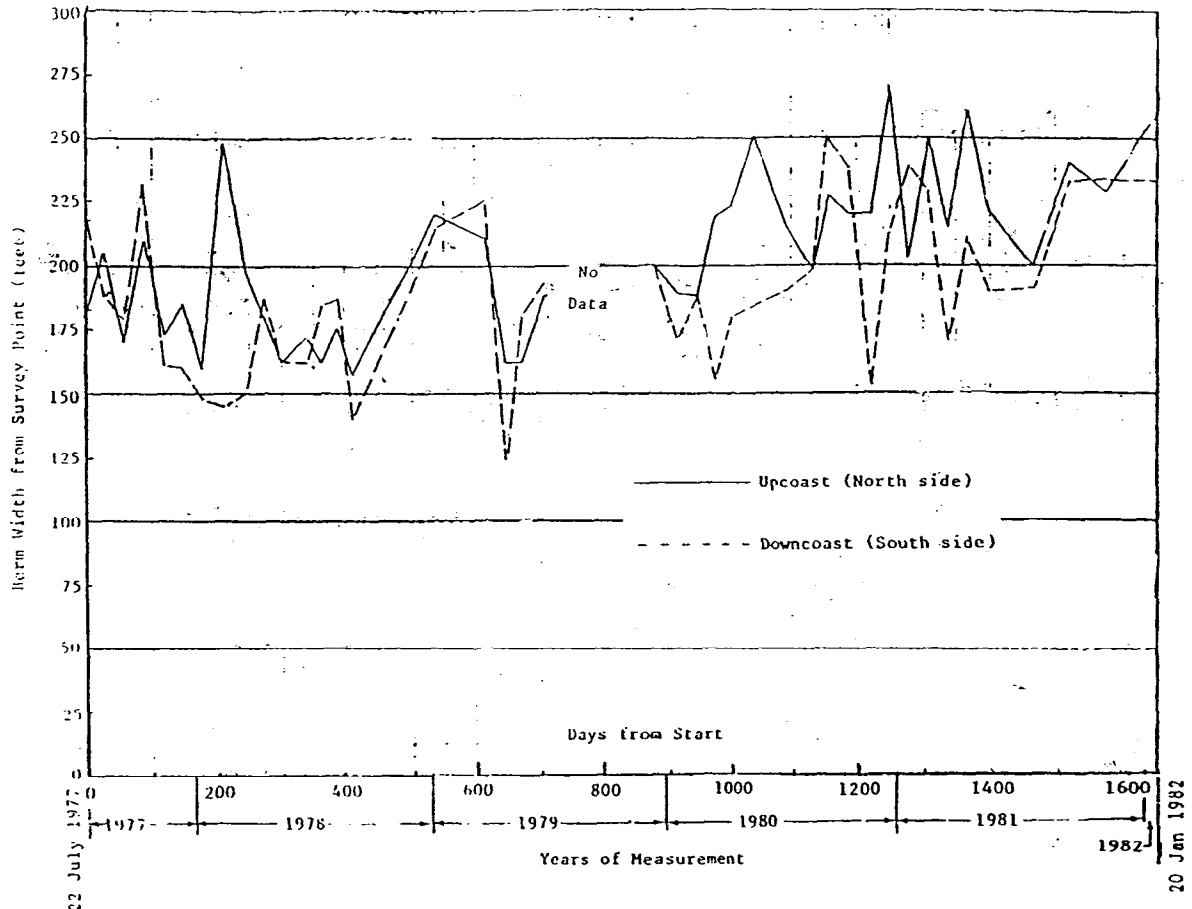


Figure 4. Data Plotted as a Function of Time
(48th Street Groin, Newport Beach, CA)

In cases where the berm width is nearly the same on both sides of a structure, and substantial changes occur in the beach width (Fall 1978 in the example), onshore or offshore movement is indicated (onshore in the case cited). In cases where beach widths sharply diverge on the two sides of the groin (early 1980 in the example), a net longshore movement is indicated in one direction (movement from north to south for the early 1980 case cited). Where berm widths on the two sides of the groin converge (Summer 1980 in the example), a reversal in the direction of longshore transport is indicated.

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